

## COLLECTION PROCEDURES FOR CAPILLARY BLOOD LEAD SPECIMENS

### MICHIGAN DEPARTMENT OF COMMUNITY HEALTH BUREAU OF LABORATORIES DIVISION OF CHEMISTRY & TOXICOLOGY TRACE METALS \ LEAD SECTION

#### Principle

Capillary and venous blood samples are collected and mailed to the Michigan Department of Community Health (MDCH) Lead Laboratory for blood lead analysis. **Meticulous cleaning and appropriate techniques are important to avoid contaminating the sample** with lead from the environment. Environmental lead contamination can cause inaccurate test results. Trace levels of lead can be found on work surfaces, the hands of the collector, hands of the patient, recycled or colored towels, etc.

#### Specimen

A capillary blood specimen is typically collected for initial lead screening. The sample is usually obtained from a finger and is collected in a blood lead micro-sampling tube or on an MDCH lab-provided filter paper card. If using the filter paper card, wait until the blood “spots” are completely dry (at least 2 circles) before closing the cover on the specimen and placing the card in the mailing envelope.

**Note: Puncturing of the fingers of infants less than one year of age is not recommended. Puncturing the heel is more suitable for these children. See the description of heel and finger specimen collection included in this mailing for details.**

When possible, a venous blood specimen should be provided for analysis as it is less susceptible to lead contamination. The sample is mixed gently as soon as obtained to thoroughly combine with the anticoagulant (EDTA) contained in the venous specimen tube. Venous and capillary whole blood samples are labeled and refrigerated until mailed, using a supplied mailing container. **Both filter paper capillary and whole blood capillary collection are screening techniques and require a diagnostic venous blood confirmation for all lead levels  $\geq 10$  ug/dL.**

#### Supplies

The following is a list of recommended supplies to have on hand:

1. Sharps waste container and biohazard bags suitable for medical waste.
2. Clean, white lint-free paper towels not recycled (Filter Paper (FP) Kit).
3. Disposable LATEX gloves and protective clothing.
4. Soap and scrubber (or clean gauze pads).
5. 70% alcohol or alcohol swabs (FP Kit).

6. Sterile cotton balls or gauze pads.
7. Lancets; blade depth 1.5 mm, blade width 1.5mm (for medium blood volume, FP Kit).
8. Blood lead micro-sampling tubes or filter paper cards (FP Kit).
9. Adhesive bandages (optional).
10. Bleach and water solution (table clean up, etc.).
11. Specimen mailing labels for venous and capillary containers and FP envelope; the **cover** of the filter paper card should be completed with identifying information **before** the specimen is collected (FP and whole blood kits).
12. Blood Lead Sampling Request Form (DCH-0696 July 2005) from MDCH (FP and whole blood kits).
13. Mailing containers that follow the Postal Service or other appropriate regulations for shipping body fluids. Filter paper submitters will mail specimens in a separate envelope (FP and whole blood kits).

## **Procedures for Specimen Collection and Processing**

### **A. General Information**

All personnel who collect specimens should be well trained, and the Centers for Disease Control (CDC) Standard Precautions must be used during collection of all blood specimens. All equipment should be within easy reach. The skill of the collector will greatly influence the specimen quality. Any necessary consent should be obtained before specimen collection begins, and the procedure should be explained to the child and the parent or guardian. The environment should be cleaned, secure and as non-threatening to the child as possible. It is important to insure a safe environment free from harm for the participants as well as the public. Appropriate infection control standards must be followed, and all personnel should have the ability to respond to emergency situations. Used material should be discarded into appropriate biohazard waste containers immediately following use. Some recommended references published by The National Committee for Clinical Laboratory Standards (NCCLS) are *Procedures for Collection of Diagnostic Blood Specimens by Skin Puncture*, H4-A4, *Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture*, H3-A4, *Procedures for the Handling and Processing of Blood Specimens*, H18-A2, *Blood Collection on Filter Paper for Neonatal Screening Programs*, LA4-A2, *Protection of Laboratory Workers from Infectious Disease Transmitted by Blood, Body Fluids, and Tissue*, M29-T2, *Analytical Procedures for the determination of Lead in Blood and Urine*, C40-A, *Clinical Laboratory Waste Management*, GP5-A, and *Clinical Laboratory Safety*, GP17-A. Each Local Health Department has been provided with the cd-rom developed by the CDC to describe and demonstrate the procedure. A filter paper collection procedure used for newborn screening is also described at <http://www.michigan.gov/newbornscreening>.

### **B. Obtaining the Specimen**

#### **1. Site Preparation**

- a. Ensure that the client=s hands are washed with soap, warm water and adequate friction to clean the site. Parents or another adult should wash children=s hands.
- b. Warming the skin-puncture site (optional) can increase blood flow through the site.  
A warm, moist, white, clean towel at a temperature no higher than 42 degrees C. may be used to cover the site for at least three minutes. This technique increases the blood flow and does not burn the skin. In addition, holding the hand/foot in position lower than the heart will increase venous pressure. The finger/heel may also be gently massaged to increase circulation before being punctured with the lancet.
- c. The specimen collector must wash his/her hands and put on disposable latex gloves. If powder is present on the outside of gloves, rinse gloved hands.
- d. The plastic capillary micro-sampling tubes are completely assembled and ready to use. **Do not touch the inside of the cap, or the plastic capillary tube, or allow it to touch the work surface.** Do not use the old open channel collector micro-sampling tubes.
- e. If using the filter paper collection card: do not touch the inside of the card, including the inside of the cover or the collection circles either before collection or while the card is wet with the specimen. Place the wet specimen in a protected place for at least 10 minutes or up to 3 hours until the specimen is completely dry.

## **2. Cleaning the Site**

Scrub the child=s middle or ring finger, (preferably one that is not sucked) or heel (infant) thoroughly with soap and scrubber or soaped gauze pad for approximately two minutes. (Scrubbing can increase blood circulation in the finger/HEEL.) Rinse well with water. **Once washed, the finger/heel must not be allowed to contact any surface, including the child=s other fingers.**

## **3. Alcohol Preparation**

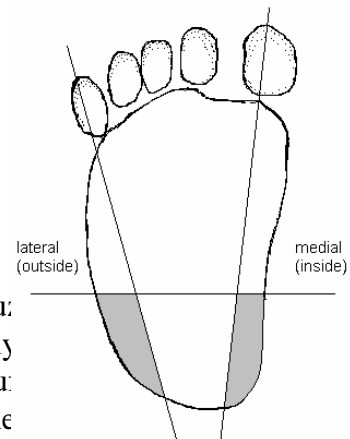
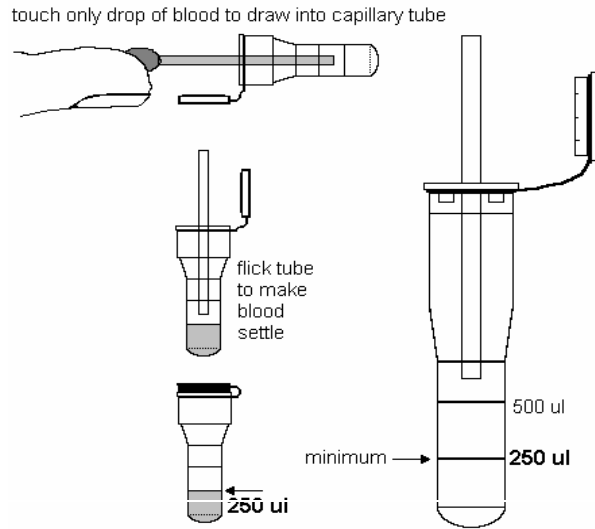
The skin should be cleaned with an alcohol swab (70% isopropanol). Excess alcohol should be wiped away with dry sterile gauze, and the skin allowed to air dry. **Alcohol residue remaining on the skin may dilute the specimen** and adversely affect test results.

## **4. Skin Puncture**

**a. Finger Puncture** Firmly grasp and isolate the client=s finger between your thumb and index finger with the palm of the child=s hand facing up. Using a sterile, disposable lancet, make a quick puncture **on the side of the finger, halfway between the fingernail and the center of the finger pad.** The side of the finger is less sensitive than the finger

pad but take care not to lance too close to the nail bed. Make the puncture (across) horizontal to the fingerprint. The first drop or two of blood should be wiped away with sterile gauze.

**b. Heel Puncture** If performing a heel puncture on an infant, use the most medial or lateral portion of the plantar surface of the heel, where Amedial@ is defined as close to the midline of the body, Alateral@ is defined as away from the midline of the body, and Aplantar surface@ as the walking surface of the foot. Disposable skin puncture lancets of different designs are commercially available for performing the heel stick on infants.



## 5. Sample Collection

Quickly wipe away the first drop of blood with a sterile gauze (do not contain excessive tissue fluid.) It is often necessary to apply (squeeze and release) to the finger/heel in order to obtain sufficient blood. **not milk, press or squeeze excessively.** This can lead to the admixture of tissue fluids with the specimen, rendering the sample unsatisfactory for analysis. Do not let the blood run down the finger/HEEL or onto the fingernail. Do not allow the finger/heel to touch the filter paper card. Collect the freely flowing blood in the blood lead micro-sampling tube/filter paper by holding the tube horizontally and touching the tip of the plastic capillary tube to the underside of the drop. Blood will flow freely into the capillary and directly into/ONTO the attached tube/filter paper. It is important that the flow of blood be adequate enough to fill the capillary rapidly. Do not stop to shake or tap the tube until you have drawn the amount of blood needed. An air bubble will stop the flow. To prevent lead contamination, do not allow the capillary tube to touch the skin. Fill the tube to at least the 250 uL mark. After filling, turn the capillary/tube unit immediately in a vertical position to allow the blood to flow into the tube. Gently flick the bottom of the tube several times to begin the mixing process. Remove the capillary tube and its holder at the same time. Close the tube with the attached cap. Invert the tube gently several times (about 15 seconds) to complete the mixing process. Clotting can be avoided by prompt and thorough mixing of blood and anticoagulant, which is contained in the specimen tube. Apply AN adhesive bandage to

the puncture site if there is no chance of the child choking on a removed bandage, or apply pressure to the site with sterile gauze or cotton until the bleeding stops. If bleeding continues after three to five minutes of applying pressure, consult with a physician before releasing the client.

If using the filter paper card: Completely saturate at least 2 of the specimen circles. It is acceptable to place multiple drops of blood into each circle, unless the circle has begun to dry, at that point you must continue collecting by using a fresh circle on the card. Do not allow the card to touch the finger/heel. When collection is complete, place the filter paper card in a protected spot; close the cover only when the specimen is completely dry. It must be protected from contamination (hands, air, surfaces, etc.) until it is dry.

## **6. Sample Processing**

Label the capillary/venous collection tube with the client's last and first name. Filter paper cards are labeled prior to collection. Also, number the label so that it agrees with a number entered under the Specimen Information box (Tube-Submitter ID) on the requisition. Complete all information requested on form DCH-0696 July 2005. **Samples will be rejected if they are improperly labeled, do not meet minimum volume requirements (insufficient amount, I.A.), if they are clotted (Clot), or unsatisfactory filter paper as indicated in attached power point pictures.** Occasionally, specimens are damaged in the mail to the extent that they cannot be tested. Regardless of the cause of rejection, a new sample from the patient is required.

## **C. Handling and Mailing Blood Samples**

The handling and shipping of blood lead specimens to MDCH involves exacting attention to completing the Blood Lead Sampling Request (DCH-0696 July 2005) and following the mailing instructions.

### **1. Completing Blood Lead Sampling Request**

When preparing the data sheet to be mailed to the laboratory, it is very important that it is **completely** and properly filled out. Do not write in the field marked "Date Received @ MDCH, Initials or MDCH Specimen Number@. All information must be typed or printed legibly with ink. The sampling requests are set up to include only one patient name so the request may be scanned for character recognition. To reduce any confusion, do not try to put more than one name on a request. **Check that the number and name on the sample tube match exactly the tube-submitter ID and name fields on the corresponding data sheet.** Be sure to keep the yellow copy of the sampling request for your clinic records. All of this information also applies to submission of filter paper specimen collections.

#### **a. Submitter Information**

The submitter information section at the top of the data sheet must be accurate and

complete.

**Submitter Clinic Code:** If you do not have a clinic code, contact the MDCH Trace Metals\Lead Laboratory (517-335-8244), as it should be issued to the submitter prior to specimen submission.

**Submitter:** If the submitter of the specimen is not the primary care provider please include the following information: Primary care provider's clinic code (if known), name, address and telephone number. The provider's complete name, address and zip code where the provider wishes the results to be sent must be included. If using an address stamp, be sure all copies of the data sheets are stamped.

**Phone Number:** It is critical that the phone number is filled out so that the laboratory can contact someone in case of problems. It is optional, but you may want to write in your fax number below the box for the telephone number.

#### **b. Patient Information**

**Patient:** The patient information section on Form DCH-0696 must also be completely filled out. This includes the client's last and first name and middle initial, complete address, telephone number, social security number, birth date, race, sex, ethnic notation (if applicable). Space is provided for the physician's name or patient's employer and the health plan or patient's occupation if applicable.

**Parent/Guardian:** It is important that the parent or guardian's name (and social security number, if available) also be recorded in case the patient cannot be reached at the address given.

#### **c. Specimen Information**

**Specimen Date:** The screening date, which is the date the sample is drawn, is required to meet Federal regulations.

**Sample Type:** The sample type is indicated by marking circle as capillary (whole blood), filter paper, or venous (whole blood) specimen.

## **2. Mailing Instructions**

Due to changes in Postal requirements, new packaging is required for mailing specimens. The old packaging material can still be used until supplies are depleted. **United States Postal Service regulations** for the routine shipping of blood lead samples to the laboratory require adherence to the following procedures:

**a.** Use only disposable biohazard mailers such as those provided by the MDCH Trace

Metals\Lead Laboratory. In addition, you will need to use absorbent material such as paper towels. Filter paper specimen submitters: only one (thoroughly dry) sample card and lab requisition is recommended per MDCH envelope.

**b. Whole Blood and FP Supplies:**

- Inner (aluminum) can for sampling tubes
- Outer (cardboard) mailing can
- Business reply and biohazard warning labels
- MDCH filter paper kit including sample envelope, mailing label, lance, towel, alcohol wipe, and filter paper card.

Apply business reply label to the cardboard mailing can or envelope and orange clinical specimen sticker to the inner cylinder if not already applied.

Place three micro-sampling tubes wrapped in absorbent paper towel material in the inner aluminum can and seal the can. **Note: Venous sampling tubes should also be sent in the aluminum cans. Do not try to force more than 3 capillary tubes, 2 large or 3 small venous tubes into the aluminum can.**

Filter paper submission requires one card for each patient MDCH requisition form.

Wrap the data sheet(s) around the aluminum can and place both in the cardboard mailing can. Note that the new single patient request sheets may only allow 2 samples per can due to having to put a request sheet in for each patient. Screw cap on cardboard mailing can and secure the cap with tape.

**c. Whole blood samples must be taken into the post office, not deposited in the mailbox.** Whole blood samples collected Thursday or Friday, or the day before a holiday, or samples collected too late in the day to make it to the post office must be kept **refrigerated** until the next postal working day (do not refrigerate filter paper specimens). **Whole blood samples must be mailed within seven days of the date of the service.** Specimens may be delivered by courier to the north entrance specimen receiving area (Building 44) at MDCH, 3350 N. Martin Luther King Jr. Blvd., Lansing.

### **3. Ordering Supplies**

Supplies may be ordered by calling (517) 335-9867, faxing Requisition for Clinical Specimen Shipping Unit, DCH-0568 (517)335-9039 or sending requisition to:

Michigan Department of Community Health  
Laboratory Support Unit  
927 Terminal Road  
Lansing, MI 48906

Please do not stockpile supplies. The micro-sampling tubes do have expiration dates so each clinic should order quantities to last no more than 4-8 weeks.

The following supplies are supplied by MDCH as part of the testing fee:

Capillary blood tubes (Micro-sampling)  
Filter paper collection kit with envelope for each card  
Venous blood tubes  
Mailing supplies  
DCH 0696 March 2006, Blood Lead Test Requisition Form  
Requisition for Clinical Specimen Shipping Units (DCH-0568)

Any questions or problems concerning capillary blood lead sampling and results should be directed to:

Michigan Department of Community Health  
Jeff Dupler, Trace Metals\Lead Laboratory  
PO Box 30035  
3350 N. Martin Luther King Jr. Blvd.  
Lansing, MI 48909  
(517) 335-8244  
(517) 335-9776, FAX

#### **4. Fees**

**a. Medicaid:** These blood lead specimens are tested with no charge to the submitter as long as the client Medicaid number is provided on the Blood Lead Sampling Request.

**b. Non-Medicaid:** The fee for testing a blood lead specimen for clients who are not Medicaid eligible is \$16.91, which includes supplies. In the case of clients at high risk with extreme hardship, the fee can be waived, but only with pre-approval. Contact the MDCH laboratory, (517) 335-8058 for exemptions. A check payable to the **State of Michigan** should be submitted with each non-Medicaid sample. The name of the client, or a list of clients, should be submitted with the check if the name is different from the payee. Attach the check to the Blood Lead Sampling Request and mark payment box Apayment enclosed@.

Another alternative is a quarterly billing to the submitter for the testing services. Check ABill to Provider@ on the Blood Lead Sampling Request payment box. The laboratory cannot bill insurance companies.



## MICHIGAN DEPARTMENT OF COMMUNITY HEALTH CHILDHOOD LEAD POISONING PREVENTION PROGRAM

### POINTERS FOR COLLECTING CAPILLARY BLOOD LEAD SAMPLES

- Agencies submitting blood lead samples to MDCH Laboratory must first obtain a CLINIC CODE number and supplies from **Jeff Dupler (517) 335-8244**.
- Supplies include a waterproof barrier for the work area, purple top micro-sampling tube, soap and water (or pre-moistened wipe), 1.5 to 1.9 mm one-time use retractable, disposable lancet (**MDCH lab does not supply the waterproof barrier**), alcohol wipes, 3 - 4 clean 2 x 2's, latex or vinyl gloves, paper towels, sharps container, biohazard receptacle, bandaids (optional), mailing supplies and MDCH Laboratory form (DCH 0696). If using filter paper for collection, MDCH lab includes the appropriately sized disposable lancet, the "flip-top" filter paper card and envelopes with postage for mailing.
- Assemble all equipment. Ask the parent if the child has any known bleeding tendencies or allergies to latex.

### **CLEANSING THE SKIN APPROPRIATELY IS THE MOST IMPORTANT PART OF THE PROCEDURE! Doing a thorough cleansing will avoid contaminated (and consequently falsely elevated) specimens.**

- If the child is **less than 1 year old**, a heel stick is preferred (distal lateral portion). For all other children, a finger stick on the middle or ring finger is appropriate.
- If a sink is available, scrub the selected finger thoroughly with warm soapy water, rinse with tap water and wrap with a clean paper towel.
- Ask the parent to be seated and hold the child on his/her lap, securing the child's elbow firmly to assist with the procedure. (Help the parent to help the child!)
- Put on latex or vinyl gloves. **If no sink is available**, an individually wrapped, pre-moistened wipe may be used to thoroughly scrub the finger. Wipe dry with clean 2 x 2.
- Wipe the cleansed finger with an alcohol wipe. Wipe dry with clean 2 x 2.
- Using a **one-time use, retractable lancet (1.5 mm to 1.9 mm depth)**, hold the lancet firmly to the site. Press on the first joint of the finger with your thumb to make the end of the finger "puff out." Make a quick puncture on the distal lateral portion of the clean finger, about halfway between the center of the finger, and the nail bed.
- **Wipe away** the first drop of blood with a clean 2 x 2.
- Using the micro-sampling tube, touch the capillary tube lightly to the second drop of blood and allow it to flow into the tube by capillary action, holding the finger below the child's heart and the tube in a slightly horizontal position. It is often necessary to gently press and release the finger at the first joint with your thumb to obtain each drop of blood, but be careful not to squeeze the finger excessively, or touch the capillary tube to the skin. Fill the micro-sampling tube to the 250 microliter mark (approximately 1/4 full). This usually requires 4 - 5 large drops of blood.
- Remove the capillary tube and purple top from the micro-sampling tube and replace it with the second top (attached) **immediately**. Invert the tube gently several times, mixing blood with the EDTA powder in the tube to

prevent clotting.

- **IF THE FILTER PAPER COLLECTION OPTION IS USED:**

Carefully label the specimen card with the child's last name, first name and a unique identifying number (up to 6 digits). Be sure the same unique identifying number is also recorded on the laboratory form under specimen information (TUBE/SUBMITTER ID).

Carefully touch the drop of blood to the first circle on the card, taking care to avoid touching the child's finger to the filter paper. **ONLY** the drop of blood should touch the paper card. Two to three drops of blood will be needed to completely fill each circle, and a minimum of two circles should be saturated. Superimposing one drop on another in the same circle is acceptable until the circle is saturated. **NEVER** collect additional blood in any circle after the paper has begun to dry. When at least 2 of the circles are saturated, hang or prop the collection card until completely dry, which will be approximately 10 minutes. NOTE: blood flow will be enhanced by holding the puncture site downward. **TO AVOID CONTAMINATION** at this point (a damp collection card could easily be contaminated by handling or by lead in the immediate environment) hang/prop the collection card in a protected spot. **DO NOT** stack wet specimens, and **DO NOT** expose them to heat or direct sunlight. Then proceed as follows.

- Wipe the puncture site clean with a dry 2 x 2. If a hemoglobin sample is to be obtained, **THE NEXT FULL DROP OF BLOOD MAY BE COLLECTED FOR ANALYSIS USING THE HEMACUE CUVETTE** and following the Hemacue procedure. Ask the parent to hold pressure on the puncture site with a 2 x 2 while you proceed with the hemoglobin analysis. If needed, a bandaid may be applied, but **only with the parent's permission, as it could be a choking hazard.**
- Carefully label the micro-tube with the child's last name, first name and a unique identifying number (up to 6 digits). Be sure the same unique identifying number is also recorded on the laboratory form.
- Wrap the whole blood specimen in a portion of paper towel and place in the inner can. Fold the white copy of the MDCH laboratory form and wrap around the inner can. Up to two specimens may be placed in each inner can, each with a separate Form 0696. Place this package into the outer mailing tube and secure the top with masking tape. Attach postage paid mailing label. If specimens are being sent by courier to MDCH lab, the mailing label is not needed. Mail promptly. Do not allow specimen to be exposed to extreme temperatures. Refrigerate whole blood if keeping overnight.
- **IF THE FILTER PAPER COLLECTION OPTION IS USED:**
- When the specimen card is completely dry, cover the specimen by closing the "matchbook"-type cover. Place the specimen and the lab slip for that child in a postage-paid envelope to be mailed to MDCH lab.
- Discard all used supplies safely, using universal precautions.

Fill out the Michigan Department of Community Health Laboratory form (DCH 0696) accurately and **completely. THIS INFORMATION MAY BE NEEDED FOR FOLLOW-UP OF THE CHILD!** Don't forget to ask the name of the child's primary care provider and Health Plan (if applicable) and record it on the form, so that MDCH lab can notify the provider as well as the submitter of results (if provider and submitter are different).

Michigan Department of Community Health  
Childhood Lead Poisoning Prevention Program and BOL/Trace Metals Section

## Dried Blood Spot Collection for Lead Testing

### *1) Collection Procedure*

- The MDCH follows the recommendations of the National Committee for Clinical Laboratory Standards (NCCLS) for collecting an acceptable specimen
  - "Blood Collection on Filter Paper for Neonatal Screening Programs: Approved Standard- Fourth Edition" (July 2003)

### *2) Collection Procedure*

- Wash the child's hands or foot 3 times
- Use warm water and mild soap
- After rinsing, dry with a disposable towel or tissue
- Wipe the 3<sup>rd</sup> or 4<sup>th</sup> finger and wipe with an alcohol wipe (supplied in collection kit)
- Allow the washed and alcohol prepped finger or foot to dry for 30 seconds

### *3) Collection Procedure*

- Use capillary blood from finger or heel sticks
- Fill in at least two of the five circles
- Apply blood to **only one side** of the filter paper
- Dry Flat at least 10 minutes to 3 hours
- Mail to state laboratory within 24 hours of collection

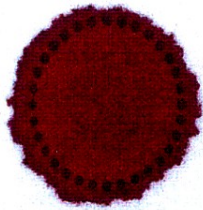
### *4) Collection Procedure*

- Puncture finger or heel with lancet of no more than 2.0 mm in depth
- Wipe away first drop of blood
- Apply gentle pressure to allow a large drop of blood to form
- Lightly touch filter paper to large drop of blood
- Allow blood to soak through to completely fill the circle

### Things to Avoid

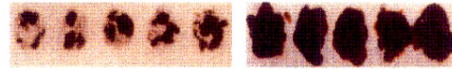
- Apply blood to both sides of the filter paper
- Apply "layers" of blood onto the same circle
- Apply excessive amounts of blood (circles should not touch one another)
- Allow filter paper to come in contact with other substances

### Valid Specimen



- Allow sufficient amount of blood to soak through to completely fill the circle

### Unsatisfactory Specimens



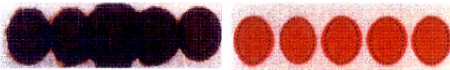
#### Insufficient

- All circles not filled with blood
- Entire circle not filled with blood
- Blood did not soak through the filter paper

#### Scratched or Abraded

- Capillary tube used
- Filter paper mutilated

### Unsatisfactory Specimens



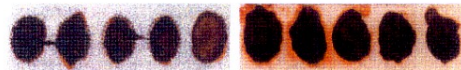
#### Supersaturated

- Application of excess blood, usually with a device (syringe)
- Blood should not touch between circles

#### Not Dry before mailing

- Placed in sealed plastic bag before dry

### Unsatisfactory Specimens



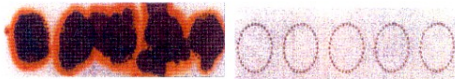
#### Clotted or Layered

- Layers of blood on same circle of card
- Capillary tube used for collection
- Blood applied to both sides of filter paper

#### Diluted or Contaminated

- Foot not dried completely from alcohol
- Something spilled on filter paper before or after blood collection

### Unsatisfactory Specimens



#### Serum Rings

- Serum separated into clear rings around blood spot
- Card dried vertically (on side) instead of flat
- Squeezing excessively around puncture site

#### No Blood

### Drying/Mailing Instructions

- Air dry specimen FLAT for at least 10 minutes, 3 hours recommended
  - Keep away from heat and direct sunlight
- Mail specimens within 24 hours of collection
  - Do not hold specimens for bulk mailing
  - Pre-addressed envelopes are available for prompt mailing